

CLAIMS

1. A calibration method for use in a head loading/unloading type disk apparatus having a voice coil motor for driving a carriage to move a head in a direction of radius of a disk, a voice coil motor velocity detection circuit for detecting a voice coil motor velocity corresponding to a back electromotive force of the voice coil motor, and a ramp mechanism arranged outside an outer periphery of the disk to retract the head, comprising the steps of:
- executing, at the start of loading control for loading the head from the ramp mechanism onto the disk, calibration for correcting a relationship between a value of a voice coil motor current flowing through the voice coil motor and the voice coil motor velocity detection value detected by the voice coil motor velocity detection circuit, said calibration being executed by obtaining a voice coil motor velocity detection value detected by the voice coil motor velocity detection circuit in a state where an actual velocity of the voice coil motor is set to zero and a current is supplied to the voice coil motor; and
- periodically reexecuting said calibration after the head is loaded.
2. A method according to claim 1, wherein after the head is loaded, the carriage is periodically moved to an inner-periphery stopper position to reexecute

said calibration.

3. A method according to claim 1, wherein after the head is loaded, unloading is periodically performed and the carriage is moved to an outer-periphery stopper position to reexecute said calibration, and reloading is performed after the reexecution.

4. A calibration method for use in a head loading/unloading type disk apparatus having a voice coil motor for driving a carriage to move a head in a direction of radius of a disk, a voice coil motor velocity detection circuit for detecting a voice coil motor velocity corresponding to a back electromotive force of the voice coil motor, and a ramp mechanism arranged outside an outer periphery of the disk to retract the head, comprising the steps of:

executing, at the start of loading control for loading the head from the ramp mechanism onto the disk, calibration for correcting a relationship between a value of a voice coil motor current flowing through the voice coil motor and the voice coil motor velocity detection value detected by the voice coil motor velocity detection circuit, said calibration being executed by obtaining a voice coil motor velocity detection value detected by the voice coil motor velocity detection circuit in a state where an actual velocity of the voice coil motor is set to zero and a current is supplied to the voice coil motor; and

if it is detected that a change in a temperature of the voice coil motor or an ambient temperature thereof from a temperature during loading is not less than a prescribed value after the head is loaded,
5 reexecuting said calibration.

5. A method according to claim 4, wherein if the temperature change is not less than the prescribed value after the head is loaded, the carriage is moved to an inner-periphery stopper position to reexecute
10 said calibration.

6. A method according to claim 4, wherein if the temperature change is not less than the prescribed value after the head is loaded, unloading is performed and the carriage is moved to an outer-periphery stopper
15 position to reexecute said calibration, and reloading is performed after the reexecution.

7. A calibration method for use in a head loading/unloading type disk apparatus having a voice coil motor for driving a carriage to move a head in
20 a direction of radius of a disk, a voice coil motor velocity detection circuit for detecting a voice coil motor velocity corresponding to a back electromotive force of the voice coil motor, and a ramp mechanism arranged outside an outer periphery of the disk to
25 retract the head, comprising the steps of:

executing, at the start of loading control for loading the head from the ramp mechanism onto the disk,

calibration for correcting a relationship between
a value of a voice coil motor current flowing through
the voice coil motor and the voice coil motor velocity
detection value detected by the voice coil motor
5 velocity detection circuit, said calibration being
executed by obtaining a voice coil motor velocity
detection value detected by the voice coil motor
velocity detection circuit in a state where an actual
velocity of the voice coil motor is set to zero and
10 a current is supplied to the voice coil motor;
reading out the voice coil motor velocity
detection value immediately after loading control is
switched to on-track control from the voice coil motor
velocity detection circuit and storing the readout
15 value in a memory; and
monitoring the voice coil motor velocity detection
value detected by the voice coil motor velocity
detection circuit while the head is positioned on the
disk and, if an absolute value of a difference between
20 the monitored voice coil motor velocity detection value
and the voice coil motor velocity detection value
stored in said memory is not less than a prescribed
value, reexecuting said calibration.

8. A method according to claim 7, wherein if the
25 absolute value of the difference between the monitored
voice coil motor velocity detection value and the voice
coil motor velocity detection value stored in said

memory is not less than the prescribed value, the carriage is moved to an inner-periphery stopper position to reexecute said calibration.

5 9. A method according to claim 7, wherein if
the absolute value of the difference between the monitored voice coil motor velocity detection value and the voice coil motor velocity detection value stored in said memory is not less than the prescribed value, unloading is performed and the carriage is moved to
10 an outer-periphery stopper position to reexecute said calibration, and reloading is performed after the reexecution.

10. A calibration method for use in a head loading/unloading type disk apparatus having a voice
15 coil motor for driving a carriage to move a head in a direction of radius of a disk, a voice coil motor velocity detection circuit for detecting a voice coil motor velocity corresponding to a back electromotive force of the voice coil motor, and a ramp mechanism
20 arranged outside an outer periphery of the disk to retract the head, comprising the steps of:

executing, at the start of loading control for loading the head from the ramp mechanism onto the disk, calibration for correcting a relationship between
25 a value of a voice coil motor current flowing through the voice coil motor and the voice coil motor velocity detection value detected by the voice coil motor

velocity detection circuit, said calibration being
executed by obtaining a voice coil motor velocity
detection value detected by the voice coil motor
velocity detection circuit in a state where an actual
5 velocity of the voice coil motor is set to zero and
a current is supplied to the voice coil motor; and

if a predetermined time has elapsed since the head
is loaded when an unload instruction is received,
reexecuting said calibration and performing unloading
10 thereafter.

11. A method according to claim 10, wherein the
carriage is moved to an inner-periphery stopper
position to reexecute said calibration when the unload
instruction is received.

15 12. A calibration method for use in a head
loading/unloading type disk apparatus having a voice
coil motor for driving a carriage to move a head in
a direction of radius of a disk, a voice coil motor
velocity detection circuit for detecting a voice coil
20 motor velocity corresponding to a back electromotive
force of the voice coil motor, and a ramp mechanism
arranged outside an outer periphery of the disk to
retract the head, comprising the steps of:

executing, at the start of loading control for
25 loading the head from the ramp mechanism onto the disk,
calibration for correcting a relationship between
a value of a voice coil motor current flowing through

the voice coil motor and the voice coil motor velocity
detection value detected by the voice coil motor
velocity detection circuit, said calibration being
executed by obtaining a voice coil motor velocity
5 detection value detected by the voice coil motor
velocity detection circuit in a state where an actual
velocity of the voice coil motor is set to zero and
a current is supplied to the voice coil motor; and
if a change in a temperature of the voice coil
10 motor or an ambient temperature thereof from the
temperature during loading is not less than a
prescribed value when an unload instruction is received,
reexecuting said calibration and performing unloading
thereafter.

15 13. A method according to claim 12, wherein the
carriage is moved to an inner-periphery stopper
position to reexecute said calibration when the unload
instruction is received.

20 14. A calibration method for use in a head
loading/unloading type disk apparatus having a voice
coil motor for driving a carriage to move a head in
a direction of radius of a disk, a voice coil motor
velocity detection circuit for detecting a voice coil
motor velocity corresponding to a back electromotive
25 force of the voice coil motor, and a ramp mechanism
arranged outside an outer periphery of the disk to
retract the head, comprising the steps of:

executing, at the start of loading control for loading the head from the ramp mechanism onto the disk, calibration for correcting a relationship between a value of a voice coil motor current flowing through
5 the voice coil motor and the voice coil motor velocity detection value detected by the voice coil motor velocity detection circuit, said calibration being executed by obtaining a voice coil motor velocity detection value detected by the voice-coil motor
10 velocity detection circuit in a state where an actual velocity of the voice coil motor is set to zero and a current is supplied to the voice coil motor;

reading out the voice coil motor velocity detection value immediately after loading control is
15 switched to on-track control from the voice coil motor velocity detection circuit and storing the readout value in a memory; and

monitoring the voice coil motor velocity detection value detected by the voice coil motor velocity
20 detection circuit when an unload instruction is received and, if an absolute value of a difference between the monitored voice coil motor velocity detection value and the voice coil motor velocity detection value stored in said memory is not less than
25 a prescribed value, reexecuting said calibration and performing unloading thereafter.

15. A method according to claim 14, wherein the

carriage is moved to an inner-periphery stopper position to reexecute said calibration when the unload instruction is received.

16. A calibration method for use in a head
5 loading/unloading type disk apparatus having a voice coil motor for driving a carriage to move a head in a direction of radius of a disk, a voice coil motor velocity detection circuit for detecting a voice coil motor velocity corresponding to a back electromotive
10 force of the voice coil motor, and a ramp mechanism arranged outside an outer periphery of the disk to retract the head, comprising the steps of:
executing, at the start of loading control for loading the head from the ramp mechanism onto the disk,
15 calibration for correcting a relationship between a value of a voice coil motor current flowing through the voice coil motor and the voice coil motor velocity detection value detected by the voice coil motor velocity detection circuit, said calibration being
20 executed by obtaining a voice coil motor velocity detection value detected by the voice coil motor velocity detection circuit in a state where an actual velocity of the voice coil motor is set to zero and a current is supplied to the voice coil motor;
25 when an unload instruction is received, performing unloading by using a result of said calibration during loading; and

if the unloading indicates abnormality, moving
the carriage to an inner-periphery stopper position,
reexecute said calibration, and again performing
unloading by using a result of the reexecuted
5 calibration.

17. A head loading/unloading type disk apparatus
comprising:

a voice coil motor for driving a carriage to move
a head in a direction of radius of a disk;

10 a voice coil motor velocity detection circuit for
detecting a voice coil motor velocity corresponding to
a back electromotive force of the voice coil motor;

a ramp mechanism arranged outside an outer
periphery of the disk to retract the head;

15 a timer for measuring time; and

a controller for, at the start of loading control
for loading the head from the ramp mechanism onto
the disk, initializing and activating said timer and
executing calibration for correcting a relationship
20 between a value of a voice coil motor current flowing
through the voice coil motor and the voice coil motor
velocity detection value detected by the voice coil
motor velocity detection circuit, said calibration
being executed by obtaining a voice coil motor velocity
25 detection value detected by the voice coil motor
velocity detection circuit in a state where an actual
velocity of the voice coil motor is set to zero and

a current is supplied to the voice coil motor, and,
after loading the head, monitoring said timer,
reexecuting said calibration if a value of said timer
is not less than a prescribed time, and initializing
5 and reactivating said timer.

18. A head loading/unloading type disk apparatus
comprising:

a voice coil motor for driving a carriage to move
a head in a direction of radius of a disk;

10 a voice coil motor velocity detection circuit for
detecting a voice coil motor velocity corresponding to
a back electromotive force of the voice coil motor;

a ramp mechanism arranged outside an outer
periphery of the disk to retract the head;

15 a temperature sensor for measuring a temperature
of the voice coil motor or an ambient temperature
thereof;

a memory; and

a controller for, at the start of loading control
20 for loading the head from the ramp mechanism onto the
disk, reading out a measurement temperature of said
temperature sensor, storing the readout temperature in
said memory, and executing calibration for correcting
a relationship between a value of a voice coil motor
25 current flowing through the voice coil motor and the
voice coil motor velocity detection value detected by
the voice coil motor velocity detection circuit, said

calibration being executed by obtaining a voice coil
motor velocity detection value detected by the voice
coil motor velocity detection circuit in a state where
an actual velocity of the voice coil motor is set to
5 zero and a current is supplied to the voice coil motor,
and, after loading the head, monitoring the measurement
temperature of said temperature sensor, and reexecuting
said calibration if a temperature change from the
measurement temperature during loading stored in said
10 memory is not less than a prescribed value.

19. A head loading/unloading type disk apparatus
comprising:

a voice coil motor for driving a carriage to move
a head in a direction of radius of a disk;

15 a voice coil motor velocity detection circuit for
detecting a voice coil motor velocity corresponding to
a back electromotive force of the voice coil motor;

a ramp mechanism arranged outside an outer
periphery of the disk to retract the head;

20 a memory; and

a controller for, at the start of loading control
for loading the head from the ramp mechanism onto the
disk, executing calibration for correcting a relation-
ship between a value of a voice coil motor current
25 flowing through the voice coil motor and the voice coil
motor velocity detection value detected by the voice
coil motor velocity detection circuit, said calibration

being executed by obtaining a voice coil motor velocity
detection value detected by the voice coil motor
velocity detection circuit in a state where an actual
velocity of the voice coil motor is set to zero and
5 a current is supplied to the voice coil motor, and,
immediately after switching from loading control to
on-track control, reading out the voice coil motor
velocity detection value from the voice coil motor
velocity detection circuit and storing the readout
10 value into said memory, monitoring the voice coil motor
velocity detection value detected by the voice coil
motor velocity detection circuit while the head is
positioned on the disk, and reexecuting said
calibration if an absolute value of a difference
15 between the monitored voice coil motor velocity
detection value and the voice coil motor velocity
detection value stored in said memory is not less than
a prescribed value.